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ADJUSTABLE DISPLAY APPARATUS WITHIN AN
AUTOMOBILE WITH MOVABLE OPERATING MEANS

(Technical Field)

This invention relates to a display apparatus, particularly to a display apparatus for a mobile body, which is mounted on an automotive vehicle or the like, and is provided with a displaying means and an operating means for performing an operation of the displaying means, such that when the operation of the operating means is performed, the operating means can be projected such that it separates from the displaying means.

(Background Art)

FIG. 33 is a schematic diagram showing a principal portion of an inside of a conventional automotive vehicle.

As shown in FIG. 33, in the conventional automotive vehicle, reference numeral 330 denotes an instrument panel provided in a front portion inside the automotive vehicle, reference numeral 331 denotes an audio system such as a radio receiver, a cassette deck player, a compact disc (CD) player or the like provided in a central portion 330a of the instrument panel 330, reference numeral 332 denotes a dash board provided in a central upper portion of the instrument panel 330, reference numeral 333 denotes a steering wheel provided on the right of the instrument panel 330, reference numeral 340 denotes a driver's seat, reference numeral 341 denotes an assistant driver's seat, and reference numeral 350 denotes a central console box disposed in a position sandwiched between the driver's seat 340 and the assistant driver's seat 341.

Conventionally, the dominant configuration is to dispose the audio system 331 in the central portion 330a of the instrument panel 330.

On the other hand, with the recent proliferation of navigation systems, there have gradually come into the automobile market arrangements in which a main body (not shown) of the navigation system is disposed under the front seat such as the driver's seat, the assistant driver's seat or the like so that a displaying portion for displaying thereon map information to be outputted from the navigation system is disposed near the central portion of the instrument panel; arrangements in which the space for disposing an audio system is narrowed to dispose the displaying portion in an upper central portion of the instrument panel, i.e., to embed it inside the dash board; and arrangements in which instruments indicating the state of a brake system which is disposed on the driver's seat side of the instrument panel, are disposed in the central portion of the instrument panel. These kinds of arrangements will come to be the mainstream in the future.

In addition, regarding the disposition of the displaying portion, the following automobile arrangements are known: the displaying portion is disposed in the central upper portion of the instrument panel with a group of audio devices (i.e., is embedded inside the dash board) when not in use; and, when the displaying portion is to be used, the displaying portion is projected forward so that a display surface of the displaying portion moves substantially in parallel with the surface in the central portion of the instrument panel (in-dash type display apparatus).

In this background, Japanese Patent Application Laid-open No. 297391/1998 discloses an arrangement in which switches for the audio devices, the air conditioner or the like which are conventionally disposed in the central portion of the instrument panel are provided inside a center console disposed between the driver's seat and the assistant driver's seat. FIG. 34 is a

schematic diagram of a principal portion of the above arrangement.

In FIG. 34, reference numeral 1 denotes an instrument panel provided in a front portion inside the automobile vehicle, reference numeral 2 denotes a steering wheel provided on the right side of the instrument panel 1, reference numeral 3 denotes a gear shift lever provided in the central lower portion of the instrument panel 1, reference numeral 4 denotes a display provided in a central upper portion of the instrument panel 1, and reference numeral 5 denotes front seats, the front seats 5 being disposed by arranging an assistant driver's seat 5a and a driver's seat 5b in a line.

In addition, in a position sandwiched between the assistant driver's seat 5a and the driver's seat 5b, a center console 6 is provided. As shown in FIG. 35, the center console 6 is provided with a lid 6a and a housing portion is formed inside the center console 6 which is opened and closed by this lid 6a.

Further, in a part of the front of the center console 6, a switch disposing portion 6b is formed as a recessed shape. It is thus arranged so that a remote control unit 7 can be detachably mounted in this switch disposing portion 6b.

The arrangement described above allows a passenger seated in the driver's seat or in the assistant driver's seat of the automotive vehicle to easily operate the switches in a seated posture.

Further, Japanese Patent Application Laid-open No. 185547/1992 discloses the construction of an improved model of an in-dash type of display apparatus in the conventional art. FIG. 36 is an overall arrangement view of this apparatus.

In addition, FIGS. 37 and 38 are figures explaining states of the operation this display apparatus. FIG. 37 shows a state in which the display is not in use, and FIG. 38 shows a state

in which the display is moving to the predetermined position so as to get into a position ready for use, as shown in FIG. 36.

In FIGS. 36, 37 and 38, reference numeral 10 denotes a casing, reference numeral 11 denotes the display which is housed inside the casing 10 when it is not in use and which is taken out of the casing 10 when it is in use, and reference numeral 12 denotes a sliding member (arm) for supporting the display 11. When the display 11 is being housed, the sliding member 12 is housed inside the casing 10 together with the display 11.

However, the conventional audio devices and the image reproducing devices as described above are mounted inside the automotive vehicle. There has been a problem that the space for disposition in the central portion of the instrument panel is limited, and that the devices to be installed in this space must therefore be deliberately selected by the user. Particularly, the user who wishes to equip various kinds of audio devices and image reproducing devices inside the automotive vehicle suffers from a serious inconvenience.

Further, the audio device is disposed in the central portion of the instrument panel. Therefore, the replacement of the recording media such as cassette tapes, digital audio tapes (DAT's), compact discs (CD's), minidisks (MD's), digital versatile discs (DVD's) or the like, is problematic. Also, operation of each device can only be performed in the sitting position by passengers seated in the front driver's seat and the assistant driver's seat. Therefore, there has been a problem that passengers other than those seated in the front seats, i.e., the passengers seated in the rear seats are not allowed to perform the above operations in a seated state, with the result that the passengers seated in the rear seats suffer from a serious inconvenience.

In addition, passengers are seated far from the displaying means. Therefore, there has been a problem that the displaying means for displaying visual information from the image reproducing device or the like, which are disposed in the central portion of the instrument panel, provides only the passengers seated in the front seats good visibility. Such displaying means provide the passengers seated in the rear seats poor visibility.

Further, when the audio device or the image reproducing device is operated, the operating means thereof is normally integrated with the device. Therefore, there has been a problem that the operator is obliged to extend his or her arm toward the central portion of the instrument panel. It follows that the passengers seated in the rear seats cannot operate it, and even the passengers seated in the front seats must also change their posture from a posture leaning back in the seat to a posture forwardly bent in the seat before operating the device. Accordingly, the operation cannot easily be performed.

An arrangement is also known in which an operating means is separated as a remote controller (hereinafter refers as a remocon) from the apparatus itself. In this kind of arrangement, after having operated the device with the remote controller, the remote controller is often left detached from the housing place. Ordinarily, the remote controller is small in size. Therefore, there has been a problem that it is apt to become lost, and thus the operator goes through the inconvenience of having to look for it before operating.

Further, when the audio device, the image reproducing device or the like is disposed in the central portion of the instrument panel, such that the connection of wires or the like is made inside the instrument panel, the number of devices disposable in the narrowly-spaced instrument panel available becomes more limited. Therefore, a user is compelled to deliberately select

the specific devices to be installed. In addition, there is a problem that, since the devices are fixed to part of the instrument panel by screws or the like, replacing the mounted device with a different device is cumbersome.

Further, when devices disposed in the apparatus are activated, anybody can operate them. Therefore, when children are present in the passengers, there is a problem that persons who are not welcome to operate the devices can also gain an easy access to their operation.

Further, when the devices disposed in the apparatus are detachable, anybody can detach them. Therefore, there is a problem that the devices mounted on the apparatus are subject to being stolen, tampered with, or the like.

Further, the operating means, such as a touch panel or the like for operating the displayed contents of the displaying means is disposed together with the displaying means in the central portion of the instrument panel. Therefore, there is a problem that, in order to operate the operating means, the operator must change his or her posture from one leaning back to the seat to one forwardly bent in the seat, or the operator is obliged to extend his or her arm to the operating means, so that the operation cannot easily be done.

Further, in case the space between the seats is being used as a passage for the passengers like in a bus or the like, there has been a problem that nothing can be disposed on the floor because of a possible hindrance to the passage of the passengers.

This invention is directed to solving the above described problems. An object of the invention is to provide a display apparatus for improving the operation of the displaying means by a passenger who is leaning back in a seat, i.e., in a relaxed seated posture, by providing a displaying means disposed in the central portion of the instrument panel with an operating means

which projects rearward of the automotive vehicle compartment.

Another object of the invention is to provide a display apparatus for preventing the operating means from being lost, by arranging the displaying means and the operating means to be separable through a supporting means.

Another object of the invention is to provide a display apparatus for recognizing visual information, irrespective of a state of the operation of the operating device, by making a display only by the display surface displayable even when the operating means is overlapped with the displaying means.

Another object of the invention is to provide a display apparatus for recognizing all of the visual information to be displayed, irrespective of the size of the area of the display surface, by changing the ratio of scale of displayed contents depending on the area of the display surface as a result of overlapping of the operating means with the displaying means, so as to further improve the convenience of the apparatus.

Another object of the invention is to provide a display apparatus for recognizing the contents of the divided display, irrespective of the size of the area of the display surface, by arranging that the divided display is dependent on variances in the area of the display surface of the displaying means due to the overlapping of the operating means with the displaying means, so as to improve the convenience of the apparatus.

Another object of the invention is to provide a display apparatus whose operation is adaptable to respective users, by setting the angle of the operating means relative to the displaying means depending on the preference of the user, so as to further improve the operability of the apparatus.

Another object of the invention is to provide a display apparatus for a mobile body which is disposed inside the mobile body, such that an audio device and an image reproducing device

are provided on an installing means which is in a position sandwiched between a front driver's seat and an assistant driver's seat, and movable in the longitudinal direction of the mobile body, for enabling both passengers seated in the front seats and passengers seated in the rear seats to directly operate the devices installed inside the installing means, so as to improve the convenience of operating the apparatus to passengers.

Another object of the invention is to provide a display apparatus for a mobile body which is disposed inside the mobile body together with the display apparatus, by arranging the installing means movably with respect to positions suitable for each of the front seats, rear seats and the intermediate seats between the front seats and the rear seats, for enabling the passengers seated in all of the seats inside the mobile body to operate the devices, so as to improve the convenience for the passengers.

Another object of the invention is to provide a display apparatus for a mobile body which is disposed inside the mobile body together with the display apparatus, by moving the installing means to positions which are suitable for the front seats, the rear seats, and the intermediate seats between the front seats and the rear seats, for enabling the passengers seated in all of the seats to replace the memory medium inserted into each of the devices, so as to improve the convenience for the passengers.

Another object of the invention is to provide a display apparatus for a mobile body which is disposed inside the mobile body such that the installing means are provided with a mounting/dismounting means for detachably holding the devices, so as to easily and freely replace the devices installed inside the installing means.

Another object of the invention is to provide a display

apparatus for a mobile body which is disposed inside the mobile body such that a guide means for guiding the installing means is disposed not only on the floor portion but also on the roof portion, and the installing means are disposed on the roof portion in a situation where the installing means cannot be disposed on the floor portion, so as to make wiser use of the apparatus and further improve convenience.

Another object of the invention is to provide a display apparatus for a mobile body which is disposed inside the mobile body such that use of the devices disposed in the installing means is restricted to certain users, so as to prevent the apparatus from being wrongly operated or tampered with.

Another object of the invention is to provide a display apparatus for a mobile body which is disposed inside the mobile body such that mounting or dismounting of the devices installed in the installing means is restricted, so as to prevent the apparatus from being wrongly operated, and to prevent the devices installed inside the installing means from being stolen.

Another object of the invention is to provide a display apparatus for a mobile body which is disposed inside the mobile body such that installing means is provided with a displaying means that can be housed inside the installing means, so as to improve the visibility of the visual information even by the passengers seated in the rear seats, and to further improve the convenience of the apparatus.

(Disclosure of Invention)

The display apparatus according to this invention comprises: a displaying means for displaying visual information; an operating means for outputting the predetermined signal based on an operation; a supporting means for supporting the displaying means, where the supporting means are provided near a peripheral

portion of the displaying means, and the operating means are rotated on the supporting means. Thus, depending on how the operating means is used, the rotation of the operating means toward the displaying means improves the operability of the operating means.

The display apparatus according to this invention is arranged such that the operating means is set, at a time of non-operation, to a first position in which an operating surface faces a display surface of the displaying means and is set, at a time of operation, to a second position in which access to the operating surface is allowed by rotating operating means from the first position. Therefore, at the time of non-operation, the operating means is prevented from being wrongly operated, resulting in an improvement in the convenience of the apparatus.

The display apparatus according to this invention is arranged such that the supporting means comprises an arm portion, the arm portion being housed when the operating means is set to the first position and being projected forward when the operating means is set to the second position, so as to separate the displaying means from the operating means. Thus, when the operating means is operated, operation is enabled from a position far from the displaying means. Widening the operable range further improves the operability of the apparatus.

The display apparatus according to this invention is arranged such that, when the operating means is set to the first position, the displaying means displays visual information only on a display surface which is free from overlapping with the operating means. Thus, even in case the area of the displaying means is small, displaying can be made only within this display surface, resulting in an improvement in the convenience of the apparatus.

The display apparatus according to this invention changes

a displaying scale depending on a size of the display surface available for displaying thereon. Thus, irrespective of the size of the area of the display surface, the contents can be displayed without being missed. The visual information to be displayed can thus be recognized, resulting in a further improvement in the convenience of the apparatus.

The display apparatus according to this invention is arranged such that the displaying means enables a divided display in which a plurality of screens are displayed. In case the divided display is enabled when the operating means is set to the first position, the divided display is made only on the display surface free from overlapping with the operating means. In case the divided display is made when the operating means is set to the second position, the divided display is made on all of the display surface. Thus, irrespective of the size of the area of the display surface, it is possible to provide the divided display, thereby improving the convenience of the apparatus.

The display apparatus according to this invention is arranged such that the second position is a position in which the operating surface of the operating means forms an obtuse angle relative to the display surface of the displaying means. Thus, this facilitates the operation by the user and improves the operability of the apparatus.

The display apparatus according to this invention further comprises an angle adjusting means for adjusting an angle between the operating surface of the operating means and the display surface of the displaying means. Thus, setting of the operating means to an angle favored by the user facilitates the operation by the user, and further improves the operability of the apparatus.

(Brief Description of Drawings)

FIG. 1 is a schematic diagram showing a general arrangement of a device installation apparatus for a mobile body to be mounted on an automotive vehicle together with the apparatus according to the eighth embodiment of this invention.

FIG. 2 is a block diagram showing an overall arrangement of the device installation apparatus for a mobile body to be mounted on an automotive vehicle together with the display apparatus according to the eighth embodiment of this invention.

FIG. 3 is a schematic diagram showing an arrangement of a principal portion in FIG. 1.

FIG. 4 is a schematic diagram showing a state of the operation of a principal portion.

FIG. 5 is a schematic diagram showing a state of the operation of a principal portion.

FIG. 6 is a schematic diagram showing an arrangement of a principal portion of a device installation apparatus for a mobile body to be mounted on an automotive vehicle together with the display apparatus according to the ninth embodiment of this invention.

FIG. 7 is a schematic diagram showing the state in which a lid portion is opened moved from the state in FIG. 6.

FIG. 8 is a sectional side view showing a side section of the arrangement FIG. 6.

FIG. 9 is a block diagram showing an overall arrangement of the device installation apparatus for a mobile body to be mounted on an automotive vehicle together with the display apparatus according to the eleventh embodiment of this invention.

FIG. 10 is a block diagram showing an overall arrangement of a device installation apparatus for a mobile body to be mounted on an automotive vehicle together with the display apparatus according to the twelfth embodiment of this invention.

FIG. 11 is a flow chart showing the operation of FIG. 10.

FIG. 12 is a block diagram showing an overall arrangement of a device installation apparatus for a mobile body to be mounted on an automotive vehicle together with the display apparatus according to the thirteenth embodiment of this invention.

FIG. 13 is a flow chart showing the operation of FIG. 12.

FIG. 14 is a schematic diagram showing an arrangement of a principal portion of a device installation apparatus for a mobile body to be mounted on an automotive vehicle together with the display apparatus according to the fifteenth embodiment of this invention.

FIG. 15 is a schematic diagram of a principal portion showing a state of moving the displaying means moved from the state in FIG. 14.

FIG. 16 is a schematic diagram of a principal portion showing a state of moving the displaying means from the state in FIG. 14

FIG. 17 is a schematic diagram showing a general arrangement of a device installation apparatus for a mobile body to be mounted on an automotive vehicle together with the display apparatus according to the sixteenth embodiment of this invention.

FIG. 18 is a schematic diagram showing an overall arrangement of a display apparatus according to the first embodiment.

FIG. 19 is a schematic diagram showing the operation of moving the arrangement from the state in FIG. 18.

FIG. 20 is a schematic diagram showing the operation of moving the arrangement from the state in FIG. 18.

FIG. 21 is a schematic diagram showing the operation of moving the arrangement from the state in FIG. 18.

FIG. 22 is a sectional view showing a section of a principal portion of the display apparatus according to the first embodiment.

FIG. 23 is a schematic diagram showing the operation of a principal portion.

FIG. 24 is a schematic diagram showing the operation of a principal portion.

FIG. 25 is a schematic diagram showing a principal portion of a rotary mechanism.

FIG. 26 is a schematic diagram showing the operation of the rotary mechanism.

FIG. 27 is a schematic diagram showing an arrangement of a principal portion of the rotary mechanism.

FIG. 28 is a schematic diagram showing a principal portion of a display apparatus according to the eighth embodiment.

FIG. 29 is a schematic diagram showing the operation when a principal portion in FIG. 28 is operated.

FIG. 30 is a sectional view showing a section of the right side surface of the principal portion in FIG. 28.

FIG. 31 is a sectional view showing a section of a lower surface of a principal portion in FIG. 28.

FIG. 32 is a schematic diagram showing an operation of a principal portion of the display apparatus according to the first embodiment.

FIG. 33 is a detail view showing a principal portion of the interior of a conventional mobile body.

FIG. 34 is a detailed view of a principal portion of an inside of a conventional mobile body.

FIG. 35 is a schematic diagram showing an arrangement of a center console box provided inside a conventional mobile body.

FIG. 36 is a schematic diagram showing an arrangement of a principal portion of a display apparatus provided inside a conventional mobile body.

FIG. 37 is a schematic diagram showing operation of the display apparatus provided inside the conventional mobile body.

FIG. 38 is a schematic diagram showing a state of operation of the display apparatus provided inside the conventional mobile body.

(Best Mode for Carrying Out the Invention)

In order to describe this invention in more detail, a best mode for carrying out this invention will now be described with reference to the accompanying drawings.

First Embodiment

A description will be made about a display apparatus according to the first embodiment of this invention.

FIG. 18 is a schematic diagram showing an overall arrangement of a display apparatus according to the first embodiment, FIGS. 19, 20 and 21 are schematic diagrams showing a state of the operation moved from the state in FIG. 18.

In FIG. 18, reference numeral 1800 denotes a display apparatus provided in a central portion of an instrument panel 102. This display apparatus 1800 is constituted by: a displaying portion 1801 as a displaying means for displaying visual information; a supporting portion made up of a left side supporting portion 1803 and a right side supporting portion 1804, both serving as a supporting means for supporting an operating portion 1802 (to be described later) on both ends which correspond to lower peripheral portions 1801a of this displaying portion 1801 as viewed in FIG. 18; and the operating portion 1802 as an operating means for performing an operation of this display apparatus 1800. This operating portion 1802 is rotated on the supporting portion.

In addition, in FIGS. 19 and 20, the supporting portion constituted by the left side supporting portion 1803 and the right side supporting portion 1804 is formed by an arm portion.

At a first position in which the operating portion 1802 is housed, the arm portion is housed. At the time the operating portion 1802 is set to a second position, the arm portion moves coupled with the operating portion so as to separate the displaying portion 1801 and the operating portion 1802, which projects forward. The left side supporting portion 1803 is constituted by a first left arm portion 1803a and a second left arm portion 1803b, which is housed inside the first left arm portion 1803a, both 1803a and 1803b being defined as the arm portion. In addition, the right side supporting portion 1804 is constituted by a first right arm portion 1804a and a second right arm portion 1804b which is housed inside the first right arm portion 1804a, both 1804a and 1804b being defined as the arm portion. The first left arm portion 1803a and the first right arm portion 1804a are housed inside the instrument panel. In other words, in case the operating portion 1802 is not in use, the left side supporting portion 1803 and the right side supporting portion 1804 are, as shown in FIG. 18, housed inside the instrument panel.

In a part of each of those surfaces of the first left arm portion 1803a and the first right arm portion 1804a which face each other, i.e., in a part of the left side surface of the first right arm portion 1804a, a slit-like groove portion 1805 is formed as shown in FIG. 21, and in a part of the right side surface of the first left arm portion 1803a, a groove portion 1805 is formed, which is similar to the groove portion 1805 formed in the first right arm portion 1804a.

Further, in a part of the left side surface of the second right arm portion 1804b, a projected portion 1806 is formed. This projected portion 1806 is fit into the groove portion 1805 formed in the first right arm portion 1804a. It is thus so arranged that the projected portion 1806 slidably moves inside the groove portion 1805 coupled with the movement of the second

right arm portion 1804b. In addition, in a part of the right side surface of the second left arm portion 1803b, a projected portion 1806 is formed, which is similar to the projected portion 1806 formed in the second right arm portion 1804b. This projected portion 1806 is fit into the groove portion 1805 formed in the first left arm portion 1803a. It is thus so arranged that the projected portion 1806 slidably moves along the groove portion 1805 coupled with the movement of the second left arm portion 1803b.

Next, with reference to FIGS. 22 through 24, the mechanism for performing the operation of projecting the operating portion 1802 toward this side from the displaying portion 1801 will now be described.

FIG. 22 is a sectional view showing a section in the longitudinal direction of the left side supporting portion 1803. FIGS. 23 and 24 show the state in which the first left arm portion 1803a and the second left arm portion 1803b project in the left direction as viewed in the figures, i.e., extend in the left direction, from the state shown in FIG. 22 to the state shown in FIG. 20.

In FIG. 22, reference numeral 1810 denotes a roller portion provided inside the display apparatus. A contact surface of this roller portion 1810 comes into contact with the lower surfaces of the first left arm portion 1803a and the second arm portion 1803b.

Having been arranged as described above, once a user gives a pulling force to the operating portion 1802 so as to pull it out, the roller portion 1810 rotates in the counterclockwise direction. As a result, it first gets into the state in which the second left arm portion 1803b extends in the direction S as shown in FIG. 19, i.e., in the extending direction toward this side. At this time, although the state is as shown in FIG.

23, the relationship between the groove portion 1805 and the projected portion 1806 is such that the projected portion 1806 formed on the right side of the second left arm portion 1803b slides, coupled with the movement of the second left arm portion 1803b, inside the groove portion 1805 formed in the right side surface of the first left side arm portion 1803a. The projected portion 1806 moves to the left end portion of the groove portion 1805, resulting in a state in which the projected portion 1806 is in contact with the left end portion of the groove portion 1805.

Further, with the help of the force of pulling out the operating portion 1802, the first left arm portion 1803a is moved, with the projected portion 1806 serving as a supporting point, from a state of contact with the left end portion of the groove portion 1805 in the direction S as shown in FIG. 19 to the state as shown in FIG. 24. The display apparatus as a whole will transition to the state as shown in FIG. 20.

Next, a description will be made about a mechanism which performs the rotating operation of the operating portion 1802 to enable an operating surface 1802a to face toward the operator so as to operate the operating portion 1802.

FIG. 25 is a schematic diagram showing an principal portion of a rotary mechanism, FIG. 26 is a schematic diagram showing a state of the operation of the rotary mechanism, and FIG. 27 is a schematic diagram showing an arrangement of an principal portion of the rotary mechanism.

In FIG. 25, reference numeral 2500 denotes a rotation restricting plate portion for restricting the rotary motion of the operating portion 1802. This rotation restricting plate portion 2500 is constituted by: a fitting hole 2501 which supports, with fitting therinto, a front end portion of a shaft portion 2701 which is integrally formed in a part of each end surface

of the operating portion 1802 as shown in FIG. 27; a groove portion 2502 which is formed into an arcuate shape; and screw holes 2504 for mounting by screws or the like on a front end of this side of the right side surface of the second left arm portion 1803b and on a front end of this side of the left side surface of the second right arm portion 1804b.

In addition, in FIG. 27, reference numeral 2700 denotes an element constituting a rotary shaft of the operating portion 1802 which is formed integrally with a part of each end surface of the operating portion 1802. This rotary shaft 2700 is also integrally formed with a plate portion 2702 which is formed into a disk shape and forms a projected portion 2503 in part thereof. The projected portion 2503 is fit into the fitting hole 2501 in the rotation restricting plate portion 2500, and a member 2710 is mounted on the rotary shaft 2700 near a front end portion 2703 thereof to prevent the rotation restricting plate portion 2500 from being pulled out.

Here, FIG. 25 shows a state in which the projected portion 2503 is fit into the groove portion 2502. Reference numeral 2503a denotes a position of the projected portion 2503 in which, as shown in FIGS. 18, 19 and 20, the operating portion 1802 is folded, i.e., is closed. Reference numeral 2503b, on the other hand, shows a position of the projected portion 2503 in which, as shown in FIG. 21, the operating portion 1802 is opened. In this manner, it is so arranged that the rotary movement is restricted by the contact of the projected portion 2503 with the end portions of the groove portion 2502.

Further, as to these operations, as shown in FIG. 26, "A" denotes a state in which the operating portion 1802 is closed. The projected portion 2503 in this state is in the position of 2503a. "B" shown in dotted lines denotes a position in which the operating portion 1802 is opened. The projected portion

2503 in this state is in the position of 2503b.

The rotary movement of the operating portion 1802 will now be described.

First, at the time of non-operation, i.e., in a state in which no operation is performed, the operating surface 1802a of the operating portion 1802 is set, as shown in FIG. 18, in a first position facing the display surface of the displaying portion 1801. On the other hand, at the time of operation, i.e., when an operation is performed, after the operating portion 1802 is pulled out of the first position shown in FIG. 18, the operating portion 1802 rotates in the direction U as shown in FIG. 21, thereby setting the operating portion 1802 in a second position in which the operation of the operating surface 1802a of the operating portion 1802 is possible.

Here, a description will be made about a series of movements to change from the state in which the operating portion 1802 is wholly housed in the display apparatus as shown in FIG. 18, to the state in which the operating portion 1802 is completely separated from the display apparatus as shown in FIG. 21, thereby enabling an operation of the operating surface 1802a.

In the state shown in FIG. 18, the user pulls out the operating portion 1802 and, after having pulled out the operating portion 1802 to the predetermined position through the positions shown FIGS. 19 and 20, the operating portion 1802 rotates in the direction U as shown in FIG. 21, thereby causing the operating surface 1802a to appear in the vehicle compartment.

On the contrary, when the operating portion 1802 is housed face to face with the displaying portion from the state shown in FIG. 21, the operations are made in the reverse direction of those as described above.

Therefore, as described above, the apparatus comprises, together with the displaying portion and the operating portion,

the supporting means which supports the operating portion and which is retractable, and the rotary mechanism which rotates the operating portion. This enables an operation of the operating portion in a position favorite to the user. In other words, the operation can be made in a comfortable posture while the user remains seated, resulting in an improvement in the convenience.

FIG. 32 shows a state in which only the operating portion 2802 rotates to transition into an operable state without pulling out the supporting portion. In this manner, depending on how the user uses it, only the rotary operation of the operating portion 2802 may be performed, without projecting the supporting portion.

Second Embodiment

A description will be made about a display apparatus according to the second embodiment of this invention.

The above first embodiment does not address a situation where the display on the display surface is in a state in which the operating surface 1802a of the operating portion 1802 is folded onto the displaying portion 1801 so that the display surface and the operating surface overlap with each other. In this second embodiment, it is possible to display information on a portion of the display surface onto which the operating surface 1802a is not overlapped. Therefore, when the operating portion 1802 is set to the first position (the housed position), information may be displayed only on the part of display surface not overlapped with the operating surface 1802. In other words, visual information such as map information or the like which is outputted by a navigation apparatus (not shown), or visual information which is outputted by an audio device, an image reproducing device or the like, is displayed only on the portion

of the display surface which is not overlapped with the operating portion 1802.

According to the embodiment described above, the displaceable portion can be effectively utilized and the convenience of the user is improved.

Third Embodiment

A description will be made about a display apparatus according to the third embodiment of this invention.

In the second embodiment as described above, the display surface of the displaying portion 1801 which is not overlapped with the operating portion 1802 is displaceable. Alternatively, the displaying scale may be changed based on the size of the displaceable display surface of the displaying portion 1801.

Namely, the area of the display surface has a ratio of approximately 1:2 between a state in which the operating portion 1802 is housed and that in which it is not. Therefore, there has been a problem that despite an attempt to display the same displayed contents on the displaying portion 1801 under any circumstances, only half of the visual information will be displayed when using the same displaying scale, in case the operating portion 1802 is housed, as compared with the case in which it is not. To solve this kind of problem, the displaying scale is changed depending on the area of the display surface in order to display the same contents of visual information. For example, in case the size of the display surface of the displaying portion 1801 is 1:2, the scale ratio of the contents is changed to 1/2:1. By this arrangement, when the area of the display surface of the displaying portion 1801 is small, although the image becomes slightly more difficult to see as compared with the case where the area of the display surface is large, it is possible to see the same displayed contents.

Accordingly, having been arranged as described above, when a user wishes to see the contents displayed on the displaying portion 1801 in detail and the operating portion 1802 is housed, the operating portion 1802 is moved into position for operation. When a user does not wish to see the contents in detail, the operating portion 1802 may be housed, so that the displayed contents are changed into the small-scale. In this manner, the convenience of the apparatus can be further improved without missing the contents.

Fourth Embodiment

A description will be made about a display apparatus according to the fourth embodiment of this invention.

The displaying portion 1801 shown in FIG. 18 provides a divided display in which a plurality of screens are displayed. In case the divided display is made when the displaying portion 1802 is set to the first position which is the housed position as shown in FIG. 18, the divided display may be made only on the display surface which is not overlapped with the operating surface 1802. In case the operating portion 1802 is set to the second position in which the operation of the operating portion 1802 is possible, the divided display may be made on the entire display surface of the displaying portion 1801. By this arrangement, based on the position of the operating portion 1802, the display surface of the displaying portion 1801 can be effectively utilized. The result is that the convenience of the apparatus is improved.

Fifth Embodiment

A description will be made about a display apparatus according to the fifth embodiment of this invention.

As shown in FIG. 21, when the operating portion 1802 is

in the second position in which the operation thereof is possible, the display apparatus may be arranged such that the operating surface 1802a of the operating portion 1802 forms an obtuse angle relative to the display surface of the displaying portion 1801. Having been arranged as described above, since the operating surface of the operating portion 1802 is set to a position easily accessible to the field of view of the user, the visibility of the operating surface and the operability are improved.

Sixth Embodiment

A description will be made about a display apparatus according to the sixth embodiment of this invention.

In the above fifth embodiment, the operating portion 1802 is in the second position in which the operation thereof is possible, the operating surface 1802a of the operating portion 1802 forms an obtuse angle relative to the display surface of the displaying portion 1801. An angle adjusting means (not shown) may be provided for adjusting the angle formed between the operating surface of the operating portion 1802 and the display surface of the displaying portion 1801 in order to adjust an inclination of the operating portion 1802 to be optimal for the user.

Having been arranged as described above, setting of the operating portion 1802 according to his or her own body further improves the visibility and the operability.

Seventh Embodiment

A description will be made about a display apparatus according to the seventh embodiment of this invention.

In the above first embodiment, when the operating portion 1802 is pulled out, the user himself pulls it out. Alternatively, a driving motor may be provided inside the display apparatus

to constitute a driving mechanism for transmitting the driving force of this driving motor to the roller portion 1810 shown in FIG. 22. Further, a switch may be provided in a part of the display apparatus so that the driving motor can be driven by the operation of this switch.

Having been arranged as described above, the operating portion 1802 can be automatically pulled out or housed by the operation of the switch. This eliminates this kind of troublesome operations, resulting in a further improvement in the convenience of the user.

Eighth Embodiment

Next, a description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the eighth embodiment of this invention.

FIG. 1 is a schematic diagram showing a general arrangement of a device installation apparatus for a mobile body according to the eighth embodiment. FIG. 2 is a block diagram showing an overall arrangement of the device installation apparatus for a mobile body according to the eighth embodiment. FIG. 3 is a schematic diagram showing an arrangement of a principal portion in FIG. 1.

In FIGS. 1, 2 and 3, reference numeral 100 denotes an automotive vehicle as a mobile body. In this eighth embodiment, a description is made based on a 6-passenger mini van type of automotive vehicle. Reference numeral 101 denotes a front glass, reference numeral 102 denotes an instrument panel which is formed by resin or the like and disposed in a front of a vehicle compartment, reference numeral 103 denotes a combination meter panel for disposing therein meters such as a speedometer, a tachometer or the like which are provided on a side of the driver's

seat (to be described later) in the instrument panel 102, and reference numeral 104 denotes a steering wheel.

Further, reference numeral 105 denotes a dash board which forms an upper portion of the instrument panel 102, and reference numeral 106 denotes a glove compartment which is provided on a side of an assistant driver's seat (to be described later) in the instrument panel 102. Further, reference numeral 2800 denotes a display apparatus which is provided in a central portion of the instrument panel 102.

Now, a description will be made about a display apparatus 2800.

FIG. 28 is a schematic diagram showing a principal portion of a display apparatus, FIG. 29 is a schematic diagram showing a state of the operation when a principal portion in FIG. 28 is operated, FIG. 30 is a sectional view showing a section of the right side surface in FIG. 28 and FIG. 31 is a sectional view showing a section of a lower surface of a principal portion in FIG. 28.

In FIG. 28, reference numeral 2800 denotes the display apparatus. This display apparatus 2800 is constituted by a displaying portion 2801 for displaying visual information, and an operating portion 2802 for controlling the operation of the display apparatus 2800. In a part of the lower portion of the displaying portion 2801, a rotary shaft 2803 of the operating portion 2802 is provided.

The operating portion 2802 is rotatable in the direction P or Q on the rotary shaft 2803. In housing the operating portion 2802 into the display apparatus, i.e., in folding the operating portion 2802 so that the operating surface of the operating portion 2802 faces the displaying portion 2801, the operating portion 2802 rotates in the direction P. To be put in the state in which the operating portion 2802 can be operated, i.e., in

the condition shown in FIG. 29, the operating portion 2802 rotates in the direction Q.

By the way, in the state in which the operating portion 2802 is folded as shown in FIG. 28, it is so arranged that the operation of the operating portion 2802 is not possible.

Then, in FIG. 1, reference numeral 107 denotes front seats. These front seats are constituted by a driver's seat 107a and an assistant driver's seat 107b. Reference numeral 108 denotes passengers' seats in an intermediate row. These intermediate seats 108 are constituted, like in the front seats 107, by a seat on the side of the driver's seat 107a, i.e., the right side seat 108a as viewed in FIG. 1 and a seat on the side of the assistant driver's seat 107b, i.e., the left side seat 108b as viewed in FIG. 1.

In addition, behind the intermediate seats 108, rear seats (not shown) are provided. Like in the front seats and the intermediate seats, they are also constituted by two seats.

Then, reference numeral 109 denotes a console box as an installing means which is provided in a position sandwiched between the driver's seat 107a and the assistant driver's seat 107b of the automotive vehicle 100. A desired device 200 such as a compact disc (CD) player 201, a cassette tape player 202, a digital versatile disc (DVD) player 203 or the like can be installed in the console box 109. On a bottom surface of this console box 109 an engaging portion 109a for engaging with a rail portion 110 (to be described later) is provided. In part of the center console box 109, a fixing lever (not shown) is provided for fixing the center console box 109 after it has moved to the predetermined position. This fixing lever is engaged with part of the rail portion 110 when the center console box 109 is fixed to the rail portion 110 and operated to release the engagement when the center console box 109 is moved.

Reference numeral 110 is the rail portion as a guide means for movably guiding the center console box 109 in the longitudinal direction of the automotive vehicle 100, i.e., in the direction A or B in FIG. 1. This rail portion 110 is formed by cutting part of the floor of the automotive vehicle 100 into a slit. As shown in FIG. 3, it is so arranged that the engaging portion 109a of the center console box 109 slides inside the rail portion 110. By means of the engaging mechanism between the rail portion 110 and the engaging portion 109 of the center console box 109, the center console box 109 is guided along the rail portion 110.

Next, a description is made with reference to FIG. 2 about an overall arrangement of the eighth embodiment.

In the center console box 109, desired devices 200 such as the CD player 201, the cassette tape player 202, the DVD player 203 or the like are disposed. An operating means 204 for operating these devices is further provided.

On the other hand, inside the instrument panel 102 there are provided: a central control means 2011 for supervising the respective control of each device mounted on the automotive vehicle; a display control means 2021 for controlling the displaying means such as a display or the like; a volume control means 2031 for controlling a volume of a loud speaker 2032 which outputs sounds; an engine control means 2041 for controlling the operation of the engine 2042 mounted on the automotive vehicle 100; and an air conditioner control means 2051 for controlling the operation of an air conditioner 2052 mounted on the automotive vehicle 100.

Here, the display control means 2021, the volume control means 2031, the engine control means 2041 and the air conditioner control means 2051 are controlled in response to the operation commands of the central control means 2011. The central control means 2011 performs the predetermined operation controls, e.g.,

stopping the operation or the like.

A description will now be made about the operation. When a passenger inside the automotive vehicle operates the control means 204, the CD player 201, the cassette tape player 202, the DVD player 203 or the like inside the center console box 109 is operated. For outputting audible information, a command is outputted by the central control means 2011 to the volume control means 2031 to perform volume control. The volume control means 2031 controls the volume of the loud speaker 2032 in response to the command of this control means 2011, thereby outputting a sound from the loud speaker 2032.

For outputting visual information, a command is outputted by the central control means 2011 to the display control means 2021 to perform display control. Control of the displaying means 2022 is taken in response to the command of this central control means 2011, thereby causing visual information to be displayed on the displaying means 2022.

Next, a description is made about the state in which the center console box 109 moves inside the automotive vehicle 100 with reference to FIGS. 4 and 5.

These FIGS. 4 and 5 respectively show the state in which the position of center console box 109 corresponds to the intermediate seats 108, and to the rear row (not shown). When the center console box 109 is moved from the position shown in FIG. 1 in the direction B, it is moved through the position shown in FIG. 4 to the position shown in FIG. 5. When the center console box 109 is moved in the direction A, it is moved in the reverse direction, i.e., from the position shown in FIG. 5 to the position shown in FIG. 1 through the position shown in FIG. 4.

Therefore, as described above, the center console box 109, which is provided as the installing means in the position sandwiched between the driver's seat 107a and the assistant

driver's seat 107b of the automotive vehicle 100 and in which the desired devices 200 as the CD player 201, the cassette tape player 202, the DVD player 203 or the like can be installed, is movable along the rail portion 110. Therefore, it becomes possible for the passengers seated other than in the front seats to operate the audio device and the image reproducing device. Particularly, memory media such as discs or the like inserted into the devices housed inside the center console box 109 may be replaced by the passengers themselves, thereby improving the convenience of the apparatus.

In addition, the movement of the center console box 109 housed therein the audio device and the image reproducing device to a position favorite to the passengers improves the convenience for the user.

In the above description, reference was made to the CD player 201, the cassette tape player 202 and the DVD player 203 as examples of the devices to be housed inside the center console box. Alternatively, other devices may be housed including game playing device, a personal computer, or other devices quite foreign to the above devices such as a water boiling equipment or the like.

Ninth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the ninth embodiment of this invention.

The center console box which was described in the eighth embodiment may also be arranged as follows.

FIG. 6 is a schematic diagram showing an arrangement of a principal portion of a device installation apparatus for a mobile body according to the ninth embodiment, FIG. 7 is a schematic diagram showing the state in which a lid portion is

opened from the state shown in FIG. 6, and FIG. 8 is a sectional side view showing a side section of FIG. 6.

In these figures, reference numeral 600 denotes a center console box as an installing means. On an upper portion of this center console box 600, a lid member 601 for the center console box 600 is provided. This lid member 601 is constituted by a left-side lid member 6011 which is disposed on the left side as viewed in the figure and a right-side lid member 6012 which is disposed on the right side, both of which are independent of each other.

One end portion of a side surface of the center console box 600 serves as an axis of rotation. When the left-side lid member 6011 is to be opened as shown in FIG. 7, it rotates in the direction C and, when it is to be closed, it rotates in the direction D. The right-side lid member 6012 rotates in the direction F when it is opened and rotates in the direction E when closed.

Reference numeral 701 shown in FIG. 7 denotes a mounting/dismounting release button which is operated by pushing in mounting or dismounting the devices housed inside the center console box 600. The operation of this mounting/dismounting release button 701 allows for mounting and dismounting the devices 702 into and out of the center console box. This enables free replacement of the devices housed inside the center console box.

Further, when the mounting/dismounting release button 701 is operated in the state as shown in FIG. 7, the mounting or dismounting of the devices is enabled.

In addition, reference numeral 801 shown in FIG. 8 denotes a connector as a mounting/dismounting means for detachably holding the audio device, the image reproducing device or the like to be housed inside the center console box 600 independent

of one another. This connector 801 is provided in a plurality of pieces so that the detachably mounted audio device, the image reproducing device or the like can be provided therein.

On a front end 8011 of each of these connectors 801, there are provided pins for: an electric power supply line (not shown) which supplies electric power from a power battery (not shown) mounted on the automotive vehicle; an audible information outputting line (not shown) which outputs audible information to be outputted from the audio device, the image reproducing device or the like to the central control means 2011 provided inside the instrument panel 102; and a visual information outputting line (not shown) which outputs the visual information. These pins 8011 are arranged such that, when the audio device, the image reproducing device or the like is housed inside the center console box 600, the pins are fit into a connector (not shown) provided on a rear surface of the device, thereby supplying electric power to the device. Also, the pins 8011 are arranged to allow the audio device, image reproducing device or the like to output the audible information and the visual information to the central control means 2011.

Reference numeral 8012 denotes a holding portion for holding the audible device and the image reproducing device when they are housed into the center console box 600, and the connectors provided in the audio device and the image reproducing device are fit into the pins 8011. When the audio device or the image reproducing device is to be dismounted from the connector 801 provided inside the center console box 600, the device to be dismounted from the center console box 600 is pulled up while operating the mounting/dismounting release button 701. Then, the holding portion 8012 is disengaged from the connector provided in the device with the help of this pulling-up force.

When the audio device or the image reproducing device is

housed inside the center console box 600, the connectors provided in the audio device and the image reproducing device fit together with the connectors 801 inside the center console box 600 to hold the audio device and the image reproducing device. Each of these devices can be dismounted from the connector 801. Therefore, the devices to be housed inside the center console box 600 can be freely replaced. In other words, even if a failure occurs in the devices, the devices can be easily removed because they are not fixed by means of screws or the like, thus improving maintenance of the apparatus. Further, the easy operation of the apparatus improves the freedom in design of the apparatus as a system.

Tenth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the tenth embodiment of this invention.

In the above ninth embodiment of this invention, a plurality of devices have been described as being housed inside the center console box 600. Alternatively, only one device may be housed therein. The same effect is obtained that the device to be housed inside the center console box 600 can easily be replaced.

Eleventh Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the eleventh embodiment of this invention.

In the above eighth embodiment, the electric power supply line, the audible information output line, the visual information output line or the like is used for connection between the audio

device, the image reproducing device or the like housed in the center console box 109 and the central control means 2011 provided inside the instrument panel 102. Alternatively, a communication network may be established between them using the technology of "Bluetooth" which has recently appeared in the mainstream.

Here, a brief description will be made about the "Bluetooth" technology.

As described in No. 759 (issued December 13, 1999) of a publication entitled "NIKKEI ELECTRONICS," "Bluetooth" is a wireless interface using as a carrier frequency an Industrial Scientific Medical (ISM) band of 2.4GHz requiring no license, and using a spread spectrum technology of frequency hopping method.

There are three classes in the transmission outputs of radio waves, in which class 1 is +20dBm (maximum transmission distance is 100m), class 2 is +4dBm, and class 3 is 0dBm (maximum transmission distance is 10m).

Here, since class 1 requires an externally mounted power amplifier circuit, ordinarily, class 2 or class 3 will have to be utilized.

By using this "Bluetooth" technology, a maximum of 7 devices can be connected in a network.

FIG. 9 is a block diagram showing an overall arrangement of the device installation apparatus for a mobile body according to the eleventh embodiment of this invention. It shows a center console box 900, an inside of an instrument panel 910, and an onboard local area network (LAN) 920 using the above "Bluetooth" technology.

Inside the center console box 900, there are provided an operating means 9041, as well as a CD player 9012, a cassette tape player 9022, and a DVD player 9032 which are operated by this operating means. Further, there are provided: a

transmitting means 9042 for transmitting an operation command of the operating means 9041; a receiving means 9011 corresponding to the CD player 9012 for receiving the transmitted signal of this transmitting means 9042; a receiving means 9021 corresponding to the cassette tape player 9022; a receiving means 9031 corresponding to the DVD player 9032; a transmitting means 9013 for transmitting an output signal of the CD player 9012; a transmitting means 9023 for transmitting an output signal of the cassette tape player 9022; and a transmitting means 9033 for transmitting an output signal of the DVD player 9032.

Here, the transmitting means 9013, 9023, 9033 receive the signals transmitted from the transmitting means 9111 so that an operation command can be outputted to each device.

A description will be made about the operation.

First, in case the CD player 9012 is operated by the operating means 9041, the receiving means 9011 of the CD player 9012 receives an operation command in response to the operation command of the operating means 9041 through the transmitting means 9042. When the operation command is received by this receiving means 9011, the CD player 9012 outputs audible and visual information. The signal outputted by this CD player 9012 is transmitted by the transmitting means 9013 and received by a transmitting/receiving means 9111 provided inside of the instrument panel 910.

Similarly, in the case of the cassette tape player 9022 and the DVD player 9032, when the operation command from the operating means 9041 is received, the receiving means 9021 or the receiving means 9031 receives the operation command through the transmitting means 9042. When this receiving means 9021 or the receiving means 9031 receives the operation command, the cassette tape player 9022 or the DVD player 9032 outputs audible information or the visual information. This output signal is

transmitted by the transmitting means 9023 or the transmitting means 9033, and received by the transmitting/receiving means 9111 of the central control means 9112 provided inside of the instrument panel 910.

Then, the central control means 9112 provided inside of the instrument panel 910 takes control of displaying the visual information through the transmitting/receiving means 9121 (if visual information is included in the signal received by the transmitting/receiving means 9111), thereby outputting the information to be displayed on the displaying means 9123.

In addition, the central control means 9112 takes control of the volume control means 9132 through the transmitting/receiving means 9111, if audible information is included in the signal received by the transmitting/receiving means 9111, in order to control the volume of the audible information and output the information to a loud speaker 9133 for outputting a sound from the loud speaker 9133.

Inside the instrument panel 910, there is provided, as another arrangement, an engine control means 9142 for controlling an engine 9143 mounted on the automotive vehicle. This engine control means 9142 is provided with a transmitting/receiving means 9141 for receiving the signal transmitted from the transmitting/receiving means 9111 in the central control means 9112.

There is further provided an air conditioner control means 9152 for controlling an air conditioner 9153 mounted on the automotive vehicle. This air conditioner control means 9152 is provided with a transmitting/receiving means 9151 for receiving a signal transmitted from the transmitting/receiving means 9111 in the central control means 9112.

Furthermore, the above transmitting path is implemented as an onboard LAN 920.

In other words, in order to configure the above network, each of the audio devices and the image reproducing devices is provided with a transmitting/receiving means adopting the ISM band of 2.4GHz. The central control means 9112 provided inside the instrument panel 910 is also provided with the transmitting/receiving means 9111 using the ISM band of 2.4GHz to build a system using a wireless type of transmitting/receiving means.

Conventionally, wiring materials such as an electric power supply line, audible information output line or the like are required to control these devices. However, in this embodiment, the wiring materials are no longer required. As a result, since the wiring space under the floor can be reduced, and the floor inside the center control box can be unobstructed. Furthermore, since a plurality of devices can be networked, each device can be centrally controlled and the freedom in design can be improved. In the above eleventh embodiment, the "Bluetooth" was used as the wireless technology. Alternatively, an infrared-ray type of wireless technology (IrDA) may also be used. By arranging in this manner, the wiring materials such as the electric power supply line, the visual information outputting line, the audible information outputting line or the like that were conventionally required to connect the devices are not required any more. As a consequence, an effect is obtained that the wiring space under the floor can be reduced.

Twelfth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the twelfth embodiment of this invention.

In the above eighth through eleventh embodiments, the

arrangements in which the audio device or the image reproducing device housed in the center console box may be opened by anybody. Alternatively, it may be restricted to being opened only by a particular user.

FIG. 10 is a block diagram showing an overall arrangement according to the twelfth embodiment, and FIG. 11 is a flow chart showing the operation of FIG. 10.

A description will first be made about the arrangement with reference to FIG. 10.

Reference numeral 1000 denotes a center console box. Inside this center console box 1000, a CD player 1001, a cassette tape player 1002 and a DVD player 1003 are provided. An operating means 1004 is provided for performing the predetermined operations of these devices.

In addition, on a part of the periphery of the center console box 1000, a user judging means 1010 for judging whether a user of the apparatus is an appropriate user or not is provided. This user judging means 1010 is arranged such that, only when the means 1010 has judged the user to be an appropriate user, the operation of the audio device and the image reproducing device housed in the center console box is permitted.

In addition, the user judging means 1010 is provided with a fingerprint verifying means 1011 for judging whether the user is an appropriate user or not by verifying the user's fingerprint, and a voice verifying means 1013 for judging whether the user is an appropriate user or not by verifying the voice of the user. The fingerprint verifying means 1011 is provided with a fingerprint memory means 1012 for storing in advance the fingerprint information of the user to be compared with user's fingerprint when the fingerprint verification is done. Further, the voice verifying means 1013 is provided with a voice memory means 1014 for storing in advance the voice information of the

user to be compared with user's voice when the voice verification is done.

Inside the instrument panel 1020 there are provided: a central control means 1021 for taking overall control of devices mounted on the automotive vehicle; a display control means 1022 for controlling the displaying means 1026 such as a display or the like; a volume control means 1023 for controlling the volume of the loud speaker 1027 which outputs a sound; an engine control means 1024 for controlling the operation of an engine 1028 mounted on the automotive vehicle; and an air conditioner control means 1025 for controlling the operation of an air conditioner 1029 mounted on the automotive vehicle.

Here, the display control means 1022, the volume control means 1023, the engine control means 1024 and the air conditioner control means 1025 are controlled by operation commands from the central control means 1021. The central control means 1021 performs the predetermined operation, e.g., stopping of operation or the like, for each device housed inside the central console box 1000.

Now, a description will be made about the operation with reference to FIG. 11.

First, once an ignition switch of the automotive vehicle is turned on (step 100), when a user wishes to play the CD player 1002, the cassette tape player 1002 or the DVD player 1003 housed in the center console box 1000, the operator, i.e., the user, pushes his or her finger against the fingerprint verifying means 1011 so as to detect his or her fingerprint.

As a result, once the fingerprint verifying means 1011 has judged to have detected the fingerprint (step 101), the fingerprint verifying means 1011 reads out from the fingerprint memory means 1012 the fingerprint that has been stored in advance by the approved user and makes a comparison with the fingerprint

detected at step 101. If the two fingerprints have been judged to coincide with each other as a result of comparison (step 102), the user can gain access to each of the devices housed in the center console box 1000.

In this state, if the operation has been specified via the operating means 1004 for any one of the devices (step 103), the device is operated based on this operation (step 104).

After having executed this step 104, if the ignition switch is turned off, the operation of each of the devices housed in the center console box 1000 is prohibited. Unless a fingerprint verification is done once again, and the intended user is judged to be the appropriate user, the devices are set to inoperable state (step 105).

After having been executed this step 105, when the ignition switch is turned on, the procedure returns to step 101 to enter into a wait condition to make a judgement as to whether the fingerprint verifying means 1011 has detected a fingerprint or not (step 106). The processing is repeated after step 102.

Here, when a fingerprint has not detected at step 101, it will again enter into a wait condition for the fingerprint detection, and the procedure returns to step 101.

Further, in case at step 102 the fingerprint verifying means 1011 has judged that the detected fingerprint does not coincide with the fingerprint that has been stored in the fingerprint storing means 1012, the procedure proceeds to step 105. Also, if no operation is made at step 103 to the device housed in the center console box 1000 even after the predetermined time elapsed, the procedure proceeds to step 105. It will be entered into a wait condition for the ignition switch to be turned off.

Further, if the ignition switch is not turned off at step 105, the procedure returns to step 103 and will get into a wait condition for the operation of the devices.

Furthermore, if the ignition switch is not turned on at step 106, the procedure returns again to step 106. It will get into a wait condition for the ignition switch to be turned on.

Therefore, when the fingerprint of the user does not coincide with the fingerprint that has been stored in advance as described above, the user is prohibited from being accessed to the devices housed in the center console box. In this manner, the restriction on the users allowed to operate the devices can be imposed. For example, the imposition of such restriction on the user leads to the prevention of operating means from being tampered by children, or to the protection of the devices from being stolen, resulting in an improvement in the convenience of the apparatus.

Thirteenth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the thirteenth embodiment of this invention.

In the above twelfth embodiment, the restriction of the user allowed to operate the audio device or the image reproducing device housed is imposed in the center console box, by using the user judging means. In case each device is detachable from the center console box, an additional restriction, aside from the restriction on the operation of each device, may be imposed on the mounting and dismounting of each device.

FIG. 12 is a block diagram showing an overall arrangement according to the thirteenth embodiment, and FIG. 13 is a flow chart showing the operation of FIG. 12.

First, a description is made about the construction with reference to FIG. 12.

The same reference numerals are used to denote the same

elements in FIG. 10, and therefore descriptions thereof are omitted.

Reference numeral 1005 denotes a mounting/dismounting operation control means for imposing a restriction by determining whether the mounting or dismounting operation of the CD player 1001, the cassette tape player 1002 and the DVD player 1003 housed in the center console box 1000 will be allowed or not based on the result of judgement by the user judging means 1010.

Then, a description will be made about the operation with reference to FIG. 13.

First, once the ignition switch of the automotive vehicle is turned on (step 200), when a user wishes to play the CD player 1002, the cassette tape player 1002 or the DVD player 1003 housed in the center console box 1000, the operator, i.e., the user, pushes his or her finger against the fingerprint verifying means 1011 so as to detect his or her fingerprint.

As a result, once the fingerprint verifying means 1011 has judged to have detected the fingerprint (step 201), the fingerprint comparing means 1011 reads out from the fingerprint memory means 1012 the fingerprint that has been stored in advance by the approved user and makes a comparison with the fingerprint detected at step 201. If the two fingerprints have been judged to coincide with each other as a result of comparison (step 202), the user can gain access to each of the devices housed in the center console box 1000.

In this state, if the operation of the operating means 1004 has made to any one of the devices (step 203), each of the devices is operated based on this operation (step 204).

Then, if the mounting/dismounting operation means 701 shown in FIG. 7 is operated to any of the devices (step 205), the mounting/dismounting control means 1005 makes it possible, based on this operation, to dismount the device to be mounted on or

dismounted from the center console box 1000 (step 206).

After having executed this step 206, if the ignition switch is turned off, the operation of each of the devices housed in the center console box 1000 enters into a prohibited state, and the mounting/dismounting operation of each device is also set to this state. Unless a fingerprint verification is done once again, and judged the intended user to be an appropriate user, each device is set to an inoperable state and unmounting/undismounting state (step 207).

After having executed this step 207, if the ignition switch is turned on, the procedure returns to step 201 to make a judgement as to whether the fingerprint control means 1011 has detected a fingerprint or not (step 208). The same processing is repeated after step 202.

Here, if a fingerprint has not detected at step 201, it will again enter into a wait condition for the fingerprint detection, and the procedure returns to step 201.

Further, in case at step 202 the fingerprint verifying means 1011 has judged that the detected fingerprint does not coincide with the fingerprint that has been stored in the fingerprint storing means 1012, the procedure proceeds to step 207. Similarly, if no operation is made at step 205 to the device housed in the center console box 1000 after a predetermined time elapsed, the procedure proceeds to step 207. The state will thus enter into a wait condition for the ignition switch to be turned off.

Further, at step 203, if no operation is made to the device housed in the center console box 1000 after the predetermined time elapsed, the procedure proceeds to step 205, and the state will enter into a wait condition for the mounting/dismounting operation of each device.

Further, if the ignition switch is not turned off at step 207, the procedure returns to step 203 and the state will get

into a wait condition for the operation of the device.

Furthermore, if the ignition switch is not turned on at step 208, the procedure returns again to step 208. The state will thus enter into a wait condition for the ignition switch to be turned on.

Therefore, as a result of comparison of the fingerprint of the user, if the detected fingerprint does not coincide with the fingerprint that has been stored in advance as described above, the restriction can be imposed to prevent the devices housed in the central console box 1000 from being operated, and also to prevent each of the devices housed in the center console box from being dismounted. The restriction of dismounting of the devices further prevents tampering and the theft.

As a means for prohibiting the mounting or dismounting of the devices housed in the center console box 1000, a method is employed for disabling the mounting or dismounting operation by canceling the above operation even if the mounting/dismounting release button 701 shown in FIG. 7 is operated.

Fourteenth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the fourteenth embodiment of this invention.

In the above twelfth and thirteenth embodiments, descriptions have been made by using a fingerprint verifying means as the user judging means. However, voice verifying means may be used in judging the user. This arrangement is expected to have an effect equivalent to that in the twelfth and thirteenth embodiments.

Further, both the fingerprint verifying means and the voice verifying means may be provided as the user judging means.

Alternatively, only one of them may be provided. In addition, both may be provided so that an appropriate user can be judged by using the results of judgments of both. The above arrangements contribute to restriction of the user, and to further improvement in the accuracy of the apparatus.

Fifteenth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the fifteenth embodiment of this invention.

In the above eighth through fifteenth embodiments, audio devices and image reproducing devices are disposed in the center console box. It may also be provided a displaying means for displaying visual information.

FIG. 14 is a schematic diagram showing an arrangement of a principal portion according to the fifteenth embodiment, and FIGS. 15 and 16 are schematic diagrams of a principal portion showing the states of the displaying means as it moves from the state in FIG. 14.

In FIGS. 14 through 16, reference numeral 105 denotes a displaying means such as a display or the like. This displaying means 105 is constituted by an operating portion 1051 and a displaying portion 1052.

This operating portion 1051 is rotatable in the direction H or G in FIG. 14. When the operating portion is folded, it rotates in the direction H so that the operating surface of the operating portion 1051 faces the displaying portion 1052.

When the operating portion 1051 is folded in this manner, the operation thereof cannot be performed.

Reference numeral 107a denotes a driver's seat and reference numeral 1400 denotes a center console box. In this center console

box 1400 a displaying means 1401 is provided, and the display surface of this displaying means 1401 faces backward.

Reference numeral 1402 denotes a housing space formed in the center console box 1401 for housing therein the displaying means 1401. It is so arranged that the displaying means 1401 can be wholly housed inside the center console box 1400.

Now, referencing to FIGS. 15 and 16, a description will be made about the operation of housing the displaying means 1401 into the center console box 1400.

When the displaying means 1401 is in use, it is disposed as shown in FIG. 14. When this displaying means 1401 is to be housed inside the center console box 1400, the orientation of the displaying means 1401 is changed to the direction I as shown in FIG. 15.

Then, as shown in FIG. 16, the displaying means 1401 is laid down in the direction K to house it inside the center console box 1400.

The center console box 1400 is thus provided, aside from the audio device and the image reproducing device, with the displaying means 1401 for displaying the visual information of these devices. When this displaying means 1401 is not in use, it is housed inside the center console box 1400. Conventionally, since the displaying means is provided in the center portion or the like in the instrument panel, the passengers seated in a position behind the front seats have difficulty seeing the visual information. This arrangement, however, has an effect that these passengers can easily see the visual information, resulting in an improvement in the visibility of the visual information.

Sixteenth Embodiment

A description will be made about a device installation

apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the sixteenth embodiment of this invention.

In the above eighth through fifteenth embodiments, descriptions have been made about an arrangement in which the center console box and the rail portion are provided on the floor portion inside the automotive vehicle. Alternatively, the center console box and the rail portion may also be provided on a roof portion of the automotive vehicle.

FIG. 17 is a schematic diagram showing a general arrangement according to the sixteenth embodiment. Reference numeral 107a denotes a driver's seat, reference numeral 108a denotes a right-side intermediate seat positioned just behind the driver's seat, and reference numeral 108b denotes a left-side intermediate seat positioned just behind the assistant driver's seat.

Reference numeral 1700 denotes a roof portion inside the automotive vehicle. In this roof portion 1700, a device installation apparatus for a mobile body is constituted, which is made up of: a center console box 1710 with a plurality of audio devices and image reproducing devices housed therein; and a rail portion 1720 which is internally engaged with an engaging portion (not shown) formed in part of the center console box and provided in the roof portion positioned between the seats disposed on the right side and the seats disposed on the left side so as to extend in the longitudinal direction of the automotive vehicle.

This center console box 1710 is movable, like in the above first embodiment, in the direction M or N shown in FIG. 17.

As described above, since the center console box 1710 and the rail portion 1720 are provided in the roof portion inside the automotive vehicle, it is possible to offer a situation in which the above apparatus can be utilized in a mobile body such

as a bus, an electric train, an airplane or the like in which the floor portion such as in the automotive vehicle cannot be used as a passage for the passengers. As a result, an effect is obtained that more applications of the invention can be found, and that the limited space inside the mobile body can be effectively used.

The above sixteenth embodiment has been described for use in situations where the floor portion of the automotive vehicle cannot be used. Needless to say, this apparatus may also be used in a case in which the floor portion can be used.

Further, it may also be provided the rail portion in both the floor portion and the roof portion so that, depending on the purpose of use, the center console box can be placed at either of the rail portions.

Seventeenth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the seventeenth embodiment of this invention.

In the above eighth through sixteenth embodiments, when the center console box is moved, it is manually moved by the user. Alternatively, a roller portion may also be provided, which comes into contact with the engaging portion of the center console box so as to rotate by a driving force of a driving motor. When the center console box is moved, the center console box which is in contact with the roller portion is automatically moved, by rotating the roller portion, along the guide of the rail portion.

In other words, when the user operates by operating the operating means such as a remote controller or the like, the driving motor is rotated in response to receiving the operation

command. By means of the roller portion which rotates in response to this rotation, the center console box is automatically moved.

Therefore, automatic moving of the central console box eliminates the trouble incident to manually moving of the center console box by the user, resulting in an improvement of the convenience of the apparatus.

Eighteenth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the eighteenth embodiment of this invention.

In the above sixteenth embodiment, the center console box can be automatically moved by the operation of the user. Alternatively, it maybe automatically returned to the predetermined position, i.e., to a default position when the ignition switch is turned on.

Therefore, owing to the arrangement as described above, because the predetermined position is a position which is convenient to the user, the position of the center console box (which is changed by the movement of the center console box) is reset when the ignition switch is turned off. The resetting occurs by automatically moving the center console box to the default position. Therefore, the user is not obliged to move the center console box whenever he or she is onboard the automotive vehicle, resulting in an improvement in the convenience of the user.

Nineteenth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive

vehicle together with a display apparatus according to the nineteenth embodiment of this invention.

In the above eighteenth embodiment, when the power source of the automotive vehicle is turned off, i.e., the ignition switch is turned off, the center console box is returned to the predetermined position, i.e., to a default position. This default position may be set to a position near the seat of the driver (who is the most frequent passenger of the automotive vehicle), i.e., to a position between the driver's seat and the assistant driver's seat.

Previous setting of the position corresponding to the seat of the driver, who is the most frequent passengers of the automotive vehicle, as the default position improves the driver's convenience.

Twentieth Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the twentieth embodiment of this invention.

The rail portion may be provided with a plurality of recessed portions at an interval, e.g., of 5cm as engaging portions for engaging the center console box. When the center console box 109 is moved based on the guide of the rail portion 110, the center console box 109 may be engaged with any one of the plurality of recessed portions. It is thus so arranged that the center console box is engaged with the recessed portion and the movement of the center console box is once stopped there.

Therefore, positioning of the moving position of the center console box can be easily made and the operability in moving operation of the console box is improved.

Twenty-First Embodiment

A description will be made about a device installation apparatus for a mobile body to be mounted inside an automotive vehicle together with a display apparatus according to the twenty-one embodiment of this invention.

In the above twentieth embodiment, the recessed portions formed in a part of the rail portion may be provided so as to correspond to the positions of seats disposed inside the automotive vehicle. The operability of the moving operation of the center console box can further be improved.

(Industrial Applicability)

As described above, the display apparatus according to this invention is suitable for use as that display apparatus for a mobile body which enables an operation of the operating means from a position remote from the displaying means for displaying thereon visual information.